Rather than create new networking standards, the ZigBee Alliance recommends existing networking standards whenever possible. For example, ZigBee specifies using the IETF's IPv6 standard at layer 3 and IEEE's 802.15.4 standard for wireless networking at layer 2. The use of standards, such as IPv6, means ZigBee networks can interoperate with existing networks.

32.8 802.15.4 Radios And Wireless Mesh Networks

IEEE has standardized several low power wireless technologies, including *bluetooth*. Various versions of 802.15.4 have been created that differ in the frequency band they use and the modulation technique they employ. Such aspects of the radio standards are irrelevant to our discussion — we are only concerned with the overall properties of 802.15.4.

As expected, 802.15.4 transfers packets. However, most of the characteristics are unexpected. Figure 32.2 summarizes key properties.

Property	Value
Networking paradigm	Packet switching
Maximum data rate	250 Kbps
Payload size (MTU)	127 octets
Maximum distance	10 meters

Figure 32.2 The key properties of an IEEE 802.15.4 wireless network link.

As the figure shows, the design of 802.15.4 differs from conventional wireless technologies in several ways. Instead of a network with throughput above 10 Mbps, 802.15.4 has an incredibly low data rate. Instead of large packets, an 802.15.4 packet has an extremely small payload. Instead of spanning enough distance to cover a complete residence, a battery powered 802.15.4 radio cannot even reach 40 feet. In practice, the effective distance will be even less if the path contains obstructions or there is electromagnetic interference.

To understand why the standard chose such parameters, observe two things:

- The key design criterion is low power
- The amount of data to be transferred is small

The constraints on packet size, data rate, and distance all derive from the goal of low power and the small volume of data to be transferred. Low power is especially important for battery operated devices: although it may not be able to transmit much data and may not be able to transmit continuously, an 802.15.4 radio node can run on a stan-